

What You Need To Know About Microbial Contamination

WHAT ARE MICROORGANISMS?

Microorganisms are microscopic creatures such as bacteria, viruses, and protozoa. Because some microorganisms are known pathogens, or disease causing agents, microbial contamination of public drinking water supplies poses a serious threat to human health.

Some known contaminants of concern in drinking water include:

- ◆ Bacteria - *Helicobacter pylori*, the *Salmonella* family, and *Escherichia coli* (E.coli).
- ◆ Viruses - Hepatitis A, Norwalk type viruses, rotaviruses, adenoviruses, enteroviruses, and reoviruses.
- ◆ Protozoa - *Giardia lamblia* and *Cryptosporidium parvum*.

Photo by H.D.A. Lindquist, U.S. EPA

WHAT IS THE THREAT TO HUMAN HEALTH?

Bacteria, viruses, and protozoa when ingested in drinking water can cause a number of infectious waterborne diseases such as cholera, typhoid, hepatitis, and infectious gastrointestinal diseases like cryptosporidiosis and giardiasis. Symptoms of waterborne disease may include fever, fatigue and weight loss (common in viral cases), vomiting, abdominal cramping, diarrhea, and stomachaches. In the most severe cases waterborne diseases can prove lethal.

WHO IS AT RISK?

Waterborne diseases pose a risk to everyone. Some individuals are more sensitive to infection and suffer more pronounced symptoms. These sensitive sub-populations include infants, young children, older persons, and immuno-compromised individuals such as persons with HIV/AIDS and those undergoing chemotherapy.

HOW CAN WE PROTECT AGAINST MICROBIAL CONTAMINATION?

Treatment

Some microbial contaminants can be removed by water treatment coagulation and filtration processes. Disinfection has been proven effective against bacteria and viruses, but protozoa, such as *Cryptosporidium*, are very resistant to chlorination alone. Other treatment methods are necessary to address *Cryptosporidium* such as ozonation, UV disinfection, or filtration.

Prevention

An important and cost effective protection for water suppliers is to prevent pathogen entry into their source water. Please see the reverse of this page for details.



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PROTECTION MEASURES TO PREVENT AND CONTROL Microbial Contamination

The first step in protecting a public water supply is the development of a watershed or wellhead protection program. Controlling or eliminating microbial sources before they contaminate a water supply will go a long way toward simplifying treatment and reducing costs associated with a contaminated supply.

The following are sources of microbial contamination within a water supply protection area and suggested protection measures aimed at reducing the risk they pose to drinking water.

SEWAGE DISPOSAL SYSTEMS

Failing sewage disposal systems represent the major source of microbial contamination from human waste. This includes large municipal waste treatment systems, pump stations, and malfunctioning on-site sewage treatment systems like cesspools, septic tanks, and leachfields.

- ◆ Implement proper planning for sewage systems within your watershed.
- ◆ Ensure septic systems are inspected and serviced on a regular basis.
- ◆ Promote public education on how to care for a septic system.



AGRICULTURE

Runoff carrying animal waste from barnyards, manure storage areas, dairy farms, pig farms, pastures, and the land application of manure is a significant source of microbial contamination.

- ◆ Ensure animal waste runoff is properly collected, settled, and stored.
- ◆ Manure storage sheds should be sited away from surface waters and should have impermeable floors and roofs.
- ◆ Install vegetative buffer strips to slow runoff flow and to act as a filter for microbial contaminants.
- ◆ Livestock should be kept out of streams and water bodies. (*MA Drinking Water regulations, 310 CMR 22.20B, prohibit livestock from within 100ft. of a reservoir and its tributaries.*)



STORMWATER RUNOFF

Rainwater and snowmelt flow over the land picking up pollutants and deposit them into water supplies. Runoff can also pick up microbial contaminants from suburban environments such as pet waste on sidewalks.

- ◆ Minimize impervious surfaces within your watershed.
- ◆ Install catch basins and settling basins to slow down flows and filter out contaminants.
- ◆ Use landscaping techniques that conserve water and limit runoff such as native plants, low maintenance grasses, shrubs, rock gardens, etc.
- ◆ Require the proper removal and disposal of pet waste.



WILDLIFE

Wildlife is an integral part of a balanced watershed. However, birds and mammals can introduce microorganisms into a water supply either through direct contact or from watershed runoff. *Giardia*, *cryptosporidium*, *salmonella*, *campylobacter*, and *Escherichia coli* (*E.coli*) are the most commonly identified microorganisms found in mammals and birds. Wildlife commonly associated with microbial contamination of drinking water supplies include: deer, beavers, muskrats, gulls, and geese.



The following protection measures should not be implemented without a good understanding of the nuisance wildlife population in question. These protection measures should not be considered as general practice but should be carefully deployed in specific areas of a water supply protection area, for example, near an intake or in areas where a nuisance wildlife population is concentrated.

- ◆ Monitor wildlife populations in and around water supplies.
- ◆ Keep up a daily human presence along the shoreline.
- ◆ Employ scare techniques such as pyrotechnics.
- ◆ Modify habitat (shoreline fencing, mowing, landscaping changes, tree branch pruning to reduce bird roosting).
- ◆ Prohibit the public from feeding wildlife, especially waterfowl.
- ◆ Reduce food sources such as palatable plant species.
- ◆ Keep beavers and muskrats from building dams/dens by installing fencing or drainage devices.
- ◆ Consider permitted trapping or hunting.

Note: Federal and/or state permits are often required for wildlife control harassment programs.



FOR ADDITIONAL INFORMATION CONTACT

MA DEP, Drinking Water Program - 617/292-5770

www.state.ma.us/dep/brp/dws

MA Fish and Wildlife - 617/626-1591

www.state.ma.us/dfwele/dfw-toc.htm

US EPA, New England Regional Office

www.epa.gov/region01/eco/drinkwater/index.html

NEIWPCC - 978/323-7929 or www.neiwpcc.org

NEWWA - 508/893-7979 or www.newwa.org